



Original communication

Autopsy following death by homicide in 644 cases

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ABSTRACT

The objectives of this study are to determine the cause of death and based on the wounds, to analyze the different epidemiological variables on homicide in Dakar.

Included were all homicides cases where an autopsy was performed and these results recorded in the autopsy register. The data collected in our work included, identity, sex, age, place of crime (location), the cause of death (the causative agent and the anatomical region injured) and the mechanism of death (the pathophysiological phenomenon causing death).

On average 56 cases of homicide a year are reported, ranging from 44 cases in 2005 to 80 cases in 1999. Extrapolated to the population of Dakar this corresponds to 1.9 homicides per 100,000 inhabitants. Victims aged over 55 years represented only 4.03% of all victims. 6.52% of cases were infanticide. The crimes mainly took place in the suburbs of Dakar (51.42% of cases). Hand held weapons were used in 578 cases (89.7%) followed by firearms in 44 cases (6.8%).

The study of the age of the victims has some interesting points. The homicide of elderly people in Senegal was relatively low in contrast to what is found in a developed country. The youthfulness of our population also explains the large number of homicide victims between 21 and 25. Infanticide is a particular problem in Senegal. In our study, 50.6% of homicides were found in the suburbs of Dakar followed by the peripheral area which accounted for 29.3% of homicides. The incidence of homicide can be directly correlated with the level of economic development. This frequency is much higher where incomes are low and particularly affect young males.

The study of this phenomenon should lead to better prevention. The victim-type in Dakar is a young man, aged 20–25 years, killed by an instrument with an injury to the skull, neck, heart or main arteries, causing bleeding and death.

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1. Introduction

In most societies, the act of homicide is considered the most serious crime. When the cause of death is criminal or suspect, court proceedings are opened and depending on the outcome of the preliminary judicial investigation, an autopsy is requested by the judicial authority. The external and internal examination of the body aims to identify the cause of death.

The objectives of this study were to determine the cause of death based on the wounds, to analyze the different epidemiological variables of homicide in Dakar (age, sex, place of occurrence and the means used by the attacker).

2. Materials and methods

Senegal has 12,855,155 inhabitants within an area of 196,712 km². Dakar, the capital has a quarter of the population (about 3,000,000 inhabitants) over an area of 550 km². The national density is 54 inhabitants per km². The density in Dakar is 4541 inhabitants per km² with a high urbanization of 97.16%.

The health system is modeled on the administrative divisions. Thus, from the base upwards, the system provides:

- Health huts at the village level
- Health posts in rural communities
- Health centers at local departmental level
- Regional hospitals
- Hospitals with greater facilities in Dakar, the capital

Dakar has five major hospitals but Forensic thanatological activities are only conducted in two, Aristide Le Dantec Hospital

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and the General Hospital of Grand Yoff. We conducted a retrospective study based on the Pathology departments at these two hospitals over a period of eleven years, from January 1997 to December 2007.

Included were all homicide cases where an autopsy was performed (which is obligatory in Senegalese law) and these results recorded in the autopsy register. The data collected in our work included, identity, sex, age, place of crime (location), the cause of death (the causative agent and the anatomical region injured) and the mechanism of death (the pathophysiological phenomenon causing death). Data was entered and analyzed using the Epi-info system version 6.4.

3. Results

During the study period, (January 1997–December 2007) 644 cases of assault followed by death were recorded, of which 614 cases were performed at Aristide Le Dantec hospital (HALD) and 30 cases at the General Hospital in Grand Yoff (Hoggy) This was from a total number of 6366 autopsies, (10.12% of the total number performed).

The distribution of assault followed by death by year (Table 1) varies greatly. On average 56 cases of homicide a year were reported, ranging from 44 cases in 2005 to 80 cases in 1999.

During the same study period, 4790 cases of violent deaths (deaths due to traffic accidents, drowning, homicides and suicides etc) were recorded and were subject to an autopsy. 644 cases of assault followed by death (Fig. 1) were recorded at an average rate of 13.5% of all violent deaths, with extremes of 8.9% (2005) and 19.2% (1999).

Extrapolated to the population of Dakar this corresponds to 1.9 homicides per 100,000 inhabitants per year.

Of the 644 homicide cases only 615 bodies (95.5%) were actually identified. 29 bodies remained unidentified (4.5% cases), these were newborn babies collected and deposited at the morgue by the police and/or firefighters.

The distribution of victims by sex was not equal. We noted a predominance of males, 558 cases (86.6%) compared to 86 female (13.4%), giving a ratio of 6.5/1.

The exact age of the victim was known in 602 cases, the other 42 cases consisted of infants whose age was not specified. Thus, 551 victims were adults (85.6%) and (93 14.4%) were children (aged less than 15 years). 388 victims (60.2%) were aged between 16 and 35 years (Fig. 2). The average age of victims was 25 years with extremes of 0 and 79 years. Victims aged over 55 years represented only 4.03% of all victims. 6.52% of cases were infanticide.

The homicides mainly took place (Fig. 3) in the suburbs of Dakar (51.42% of cases).

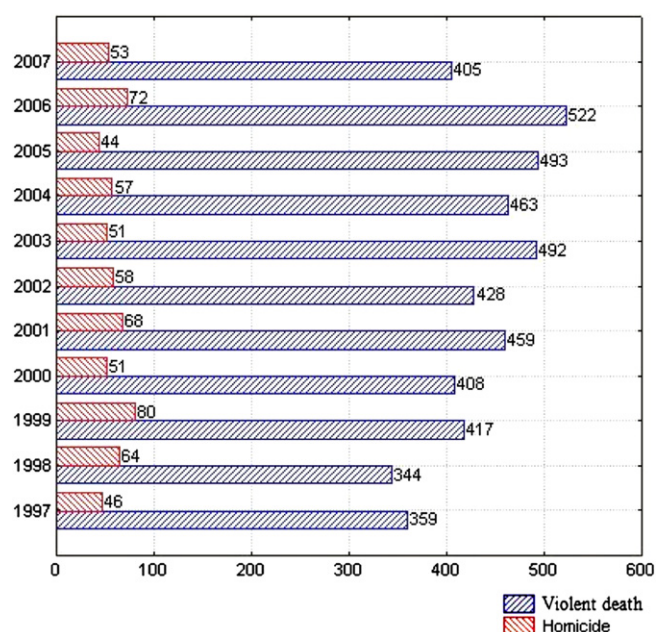


Fig. 1. Relation between homicide and other forms of violent death.

Hand held sharp or blunt weapons were used in 578 cases (89.7%) followed by firearms in 44 cases (6.8%). The other methods used were strangulation by bags and also by hand in the case of newborns causing asphyxia (Fig. 4).

Among the instruments used, there was a predominance of sharp weapons (knife, dagger, screwdriver, scissors...) in 318 cases (55%) resulting in linear wounds, transfixing or penetrating wounds, followed by blunt objects (bludgeon, hammer, cosh, baseball bat...) in 169 cases (29.3%). In 91 cases (15.7%) a weapon which was both sharp and blunt (machete, axe, sword...) was used.

Autopsies were performed immediately in 3 cases (0.5%), after a minimum of 6 h in 562 cases (87.3%) and on putrefied corpses (79 cases). In these cases the corpses had either been collected on the highway in 75 cases (11.6%) or exhumed in 4 cases (0.6%).

Rossle technique was used in 238 cases (36.95%) and the Rokitski technique in 208 cases (32.3%). In 198 cases (30.7%) the pathologist simply concentrated on the external injuries and went to the internal organ injured, without using a particular technique of dissection.

Genital swabs were taken on 5 victims (0.8%) in cases where rape was suspected.

We have also recorded for each autopsy, the organs injured as well as the direct cause of death or contributing factor. (Table 2).

Note the predominance of lung and cardiovascular system injuries (47.2%) followed by skull and neck injuries (35.2%). In 12 cases multiple organs were injured.

The distribution of homicides by the mechanism of death varied considerably.

62.6% ($n = 403$) of all homicide deaths were due to hemorrhage, 36% was internal, 15.7% was external and 10.9% to a mixed hemorrhage. 24.1% (155) deaths were due to craniocerebral trauma (central nervous system lesions) and 11.3% (78) to asphyxia (particularly after contusion). Other mechanisms of death were thermal or chemical burns.

4. Discussion

The risk of violent death is very different from one region to another across the world and even within a country.^{1–4} The scale of

Table 1
Distribution of autopsies by year.

Year	Number of autopsies	Number of homicides	Homicides-percentage of total
1997	468	46	9.62%
1998	464	64	13.79%
1999	526	80	15.21%
2000	507	51	10.06%
2001	565	68	12.04%
2002	544	58	10.66%
2003	636	51	8.02%
2004	658	57	8.66%
2005	715	44	6.15%
2006	721	72	9.99%
2007	562	53	9.43%
TOTAL	6366	644	10.12%

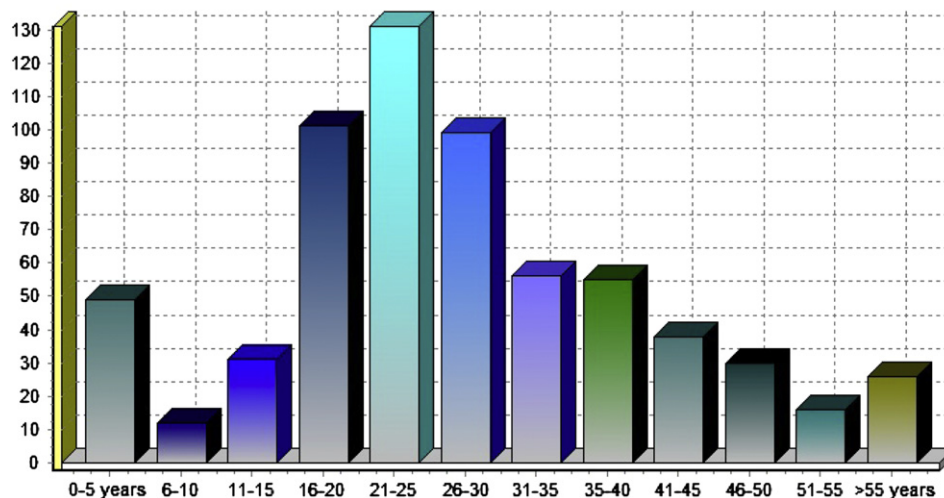


Fig. 2. Distribution of cases by age.

risk is differentiated by a ratio of 1, being a safe country (Japan) to 100 (Colombia), the most dangerous.¹

The study of the age of the victims has some interesting points. The homicide of elderly people in Senegal was relatively low in contrast to what is found in a developed country.⁵ The low levels found in our country are due to the age and the lifestyle of Senegalese society. Nearly half of Senegalese are under 15 years (42.8%), one in two Senegalese (54.7%) are under 20, and only 3.5% of the population is 65 and over. The study of Coelho et al. shows that in Portugal, for example most homicides of elderly people occur in robberies at their home, usually meaning that these old people lived alone. This is not the case in Africa where the elderly are at the center of the community and live surrounded by the whole family. This makes this situation less likely to occur here.

The youthfulness of our population also explains the large number of homicide victims between 21 and 25.

Senegal has many homicide victims between 16 and 30 year olds. These figures differ from those in developed countries such as Finland⁶ where most victims are between 31 and 40. Our numbers are similar to those found in India⁷ where, again, the victims were mainly aged 21–30 years. In 2007, the overall gross enrollment rate in education in Senegal was estimated at 35.9%. This overall level hides regional disparities. The young population, with limited education, high youth unemployment and poor living conditions are a major cause of increasing crime levels.

Infanticide is a particular problem in Senegal. The Republic of Senegal is secular, democratic and social. The population is 96% Muslim with traditional African beliefs still existing. The laws are of French origin as Senegal inherited from the law of decolonization from France in 1960. These laws were gradually replaced and adapted to a Senegalese context.

The Family Code (Civil Code) incorporates the culture and religion of Senegalese society. The voluntary interruption of pregnancy is not permitted by law in Senegal. Therapeutic abortion is allowed only when the mother's life is threatened by continued pregnancy. Adoption is rarely practiced by the people and motherhood is socially and religiously permissible only in marriage. Unmarried women with unwanted pregnancies may seek an illegal abortion during pregnancy. When they fail to get rid of the fetus, infanticide at birth is a last resort. If discovered this would cause scandal in the community as well as a possible jail sentence. There were 42 cases of infanticide in our study representing 6.5% of all homicides. Usually the Assizes Court judges cases of infanticide. National statistics show that 0.5% of total inmates in Senegalese prisons are for infanticide.

Senegal also sees a strong male predominance (86.6%) in homicides. The sex ratio is 6.5/1, comparable to that found in other international studies. Santos et al³ in Brazil have found a sex ratio of 9/1. Adinkrah in Ghana found that 89% of victims were male.⁸ According to a WHO publication in 2003 "Road accidents kill

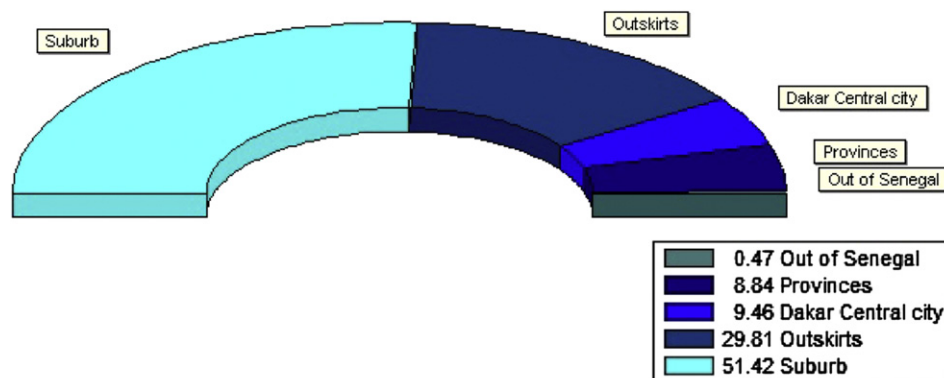


Fig. 3. Breakdown by location of assault.

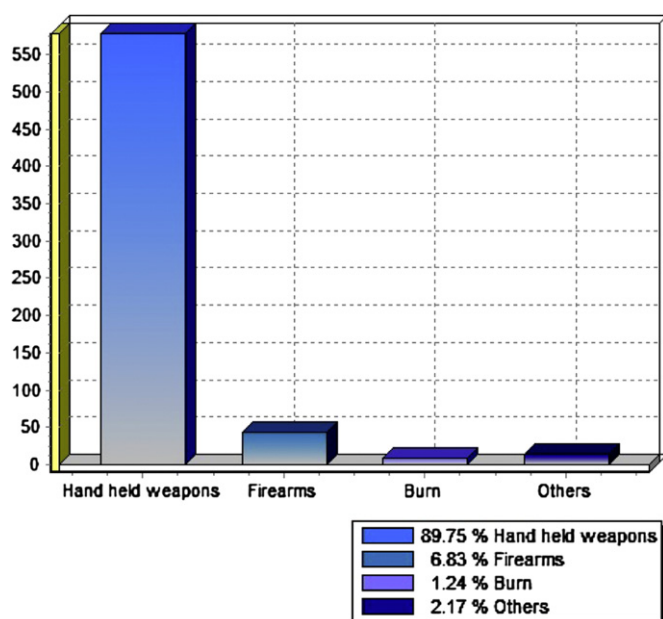


Fig. 4. Breakdown of homicides based on the instruments used.

three times more men than women and the proportion is the same for homicide."

This male predominance could be explained by the fact that men are more physically aggressive than women.^{5–7}

During the study period 4790 cases of violent deaths were reported, this includes suicide, drowning, traffic accidents etc. Among these cases of violent death, homicide accounts for 13.5%. Adinkrah in a study conducted in Ghana between 1990 and 2000 found an average annual homicide rate of 7.9% among violent deaths.⁸

In the category of violent deaths by homicide,³ Columbia comes top of the rankings with 60.8 deaths per 100,000 inhabitants, far ahead of Russia (28.4), Brazil (23.3), Kazakhstan (18.8) and Latvia (15.3).

In comparison, France is in 28th place worldwide with 0.7 homicides per 100,000 inhabitants, on a par with the United Kingdom. In the area of crime, Colombia remains high because of the existence of a "permanent war between the state and the mafia". Belgium is ranked 19th overall (1.9) and Canada 22nd (1.5). Senegal actually has the same overall rate as Belgium.

Studies on the location of homicides allow us to accurately understand the phenomenon of violence and allow us to determine "risk areas".^{3,9} The WHO estimates that nearly 90% of deaths from violent injuries occur in poor countries. The authors agree that violence is highest in poor areas of large agglomerations.^{1,3,8,10,11}

Table 2
Organs injured.

Organs injured	Number	Percentage
Skull and neck	365	35.2
Lung	215	20.7
Vascular wounds (Peripheral)	140	13.5
Heart and major arteries	135	13
Intestine, stomach and diaphragm	45	4.3
Spine trauma	32	3.1
Limb fracture	32	3.1
Liver	29	2.8
Kidney	24	2.3
Genitalia	08	0.8
Multiple organs (mutilation)	12	1.2

In our study, 50.6% of homicides were found in the suburbs of Dakar followed by the peripheral area which accounted for 29.3% of homicides. The incidence of homicide can be directly correlated with the level of economic development. This frequency is much higher where incomes are low and particularly affect young males.^{12,13}

Five bodies were subject to a vaginal or anal swab if rape was also suspected. The forensic autopsy should always be accompanied by samples for toxicological purposes to unmask a concealed homicide. To be effective an autopsy has to be fully conducted. Autopsies are incomplete in our countries. Diagnostics result from macroscopic examination and microscopic analysis. We have now in Senegal a performed laboratory in genetics. We need specialized structures in toxicology. This article allows us to issue an appeal for the equipment of our structures to reach the quality standards. That is why African states should adopt, as in the European Union the recommendation No. R (99) 3 of the Committee of Member Ministers on the harmonization of rules regarding Forensic autopsies.^{14,15} Harmonization in this area would greatly help raise the level of technical standards.

Senegal has strong gun legislation and gun ownership is very low. However another problem concerning weapons surfaces during the Muslim celebration of the feast of Tabaski (Eid El Kebir) There is an unrestricted sale of knives and machetes, adding to the proliferation of such weapons in the community.

5. Conclusion

Homicide is a reality worldwide and Senegal is no exception. The review of the 644 cases of autopsies performed in the two departments of Pathology in Senegal over a period of 11 years gives a picture on this social phenomenon and the place of the autopsy in producing the Death Certificate and criminal proceedings.

The study of this phenomenon should lead to better prevention and better death investigation. The victim-type in Dakar is a young man, aged 20–25 years, killed by an instrument with an injury to the skull, neck, heart or main arteries, causing bleeding and death.

These tragic events are likely to be found in the poorer Dakar suburbs.

Conflict of interest

None declared.

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